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NASA-15915 (June 2004)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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SECTION 15915

ELECTRIC CONTROL SYSTEMS

06/04

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers microprocessor interface requirements for control of air handling units from a central building control computer, referred to in the text as the Utility Control System (UCS).

The purpose of this section is to obtain detailed microprocessor communication protocol in order to interface an air handler microprocessor with a dissimilar building control system. Air handler microprocessor will typically communicate with a Remote Terminal Unit (RTU), which is a smart peripheral extension of the UCS.

This section should be used in conjunction with the following when applicable:

Section 15655 REFRIGERATION COMPRESSORS.

Section 15682 CENTRIFUGAL WATER CHILLERS.

Section 15764 FAN COIL UNITS.

Section 15720 AIR HANDLING UNIT WITH COILS

Section 15732 PACKAGED AIR-CONDITIONING UNITS.

Section 15736 COMPUTER ROOM AIR CONDITIONING UNITS.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

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The publications listed below form a part of this section to the extent referenced:

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA 422-B	(2000) Electrical Characteristics of Balanced Voltage Digital Interface Circuits

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.
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The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-01 Preconstruction Submittals

Records of Existing Conditions shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

SD-02 Shop Drawings

Connection Diagrams shall be submitted for air handling unit microprocessor interface in accordance with paragraph entitled, "General Requirements," of this section.

SD-03 Product Data

Equipment and Performance Data shall be submitted for air handling unit microprocessor interface in accordance with paragraph entitled, "General Requirements," of this section.

SD-07 Certificates

Parts List shall be submitted for air handling unit microprocessor interface in accordance with paragraph entitled, "General Requirements," of this section.

SD-08 Manufacturer's Instructions

Operating Instructions shall be submitted for air handling unit microprocessor interface in accordance with paragraph entitled, "General," of this section.

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals shall be submitted in accordance with paragraph entitled, "Operation and Maintenance," of this

section.

1.3 GENERAL REQUIREMENTS

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NOTE: If Section 15003 GENERAL MECHANICAL PROVISIONS is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph deleted.
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Section 15003 GENERAL MECHANICAL PROVISIONS applies to work specified in this section.

Records of Existing Conditions shall be submitted consisting of the results of Contractor's survey of work area conditions and features of existing structures and facilities within and adjacent to the jobsite. Commencement of work shall constitute acceptance of existing conditions.

Connection Diagrams shall be submitted for air handling unit microprocessor interface indicating the relation and connection of devices and apparatus by showing the general physical layout of all controls, the interconnection of one system (or portion of system) with another, and internal tubing, wiring, and other devices.

Equipment and Performance Data shall be submitted for air handling unit microprocessor interface consisting of scan rates, and response times to direct commands.

Parts List shall be submitted for air handling unit microprocessor interface listing by manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair necessary to ensure continued operation with minimal delay.

PART 2 PRODUCTS

2.1 GENERAL

Air handling units which utilize a microprocessor-based control system for monitoring alarms, temperature and humidity and control chilled water flows, heating, and humidification, shall have the capability to communicate directly with a microprocessor-based remote terminal unit (RTU) for data acquisition, alarm monitoring, set point and alarm point adjustment.

Operating Instructions shall be submitted for air handling unit microprocessor interface consisting of standard operating procedures including startup, shutdown, and emergency operation.

2.2 COMMUNICATIONS

Communications port(s) shall be a standard interface in accordance with EIA 422-B. Standard baud rate shall be 9600, on which all performance specifications shall be based. Baud rate shall be switch selectable to [4800] [2400].

Each air handling unit microprocessor shall be available for and able to communicate directly with the NASA Utility Control System (UCS) remote

terminal unit (RTU).

2.3 DIAGNOSTICS

Microprocessor control shall include a diagnostic routine that can be performed by the user to check the operation of the microprocessor.

Diagnostic routines shall be fully tested by the manufacturer prior to delivery. Diagnostics shall provide two levels of testing.

2.3.1 Automatic Diagnostics

Automatic diagnostics shall be executed upon system start-up and shall include a read/write check to memory for memory testing, minimal instruction execution check, buss and port checks.

2.3.2 Comprehensive Diagnostics

Comprehensive diagnostics shall include:

Microprocessor instructions: All defined functions and their variations

Microprocessor memory testing: Memory testing shall include comprehensive memory test with memory execution characteristic printout. Limits on memory access time, all patterns run, run time, and number of successful executions in worst case pattern shall be included in this printout.

Power supply status

Buss and port checks

Capability to be initiated remotely (through the communication link)

Performance of the diagnostics shall meet the above requirements for final acceptance of the air handling unit.

2.4 ACQUISITION POINT REQUIREMENTS

Air handling unit microprocessor shall monitor and transmit the values of the following points to the remote terminal unit (RTU):

[Cooling temperature setpoint]

[Heating temperature setpoint]

[Humidification setpoint]

[Dehumidification setpoint]

[Return air temperature]

[Return air relative humidity]

[Air handler fan operation status (loss of airflow alarm)]

[Filter status (dirty filter alarm)]

[Water flow status (loss of chilled water flow alarm)]

[Return air smoke detector alarm]

[Humidifier failure alarm]

[Under floor water sensor alarm]

[Activation of manual override alarm]

[Activation of local alarm]

[Microprocessor failure (loss of communication is a valid indication of microprocessor failure)]

Acquisition values returned for a scan request shall be returned in no more than two (2) seconds.

Air handling unit microprocessor shall respond to a scan request in no more than five (5) seconds, total, for up to 16 scanned points.

2.5 CONTROL POINT REQUIREMENTS

Air handling unit microprocessor shall accept commands from the remote terminal unit (RTU) to control the following points:

[Unit (fan) start/stop]

[Cooling temperature setpoint]

[Heat temperature setpoint]

[Humidification setpoint]

[Dehumidification setpoint]

PART 3 EXECUTION

3.1 INSTALLATION

Equipment shall be installed as indicated and in accordance with the manufacturer's recommendations.

3.2 OPERATION AND MAINTENANCE

Contractor shall submit [6] [_____] copies of the Operation and Maintenance Manuals 30 calendar days prior to testing the air handling unit microprocessor interface. Data shall be updated and resubmitted for final approval no later than 30 calendar days prior to contract completion.

-- End of Section --